566.41216VX1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): M. KUROKAWA

Serial No.: 10/726,530

Filed: December 4, 2003

For: **METHOD AND SYSTEM FOR MEASURING MEMORY AND LEARNING CAPABILITIES**

Group:

Examiner:

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

February 12, 2004

Sir:

Prior to examination, please enter thereto the following Preliminary Amendment.

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 9 of this paper.

Amendments to the Drawings begin on page 11 of this paper.

Remarks/Arguments begin on page 12 of this paper.

IN THE SPECIFICATION

Please replace the paragraph on page 1, lines 14-24, with the following amended paragraph:

To measure the memory and learning functions of small animals, for example, a Morris's water maze, a cowering reaction of small animals against an electric shock, an elevated maze, a radial arm maze and the like are utilized. According to the techniques utilizing these techniques, it is necessary that an experimenter transfers animals from a breeding cage to a specially provided experimental environment and conducts experiments in a light period (at an inactive phase of animals) in which the experimenter can observe the animals with the naked eye. To conduct experiments, the experimenter usually touches the animals so as to fasten them but touching the animals causes stresses on them in some cases due to the physical stimulus attended with the touching action. This results in occurrence of a scatter in the results of the experiments.

Please replace the paragraph on page 3, lines 7-27, with the following amended paragraph:

Fig. 1 is a schematic construction diagram illustrating ~~one embodiment of~~ a measuring system according an embodiment of to the present invention;

Fig. 2 is a perspective view of a measuring unit according to [[the]]an embodiment of the present invention;

Fig. 3 is a plan view of the measuring unit according to [[the]]an embodiment of the present invention;

Fig. 4 is a front view of the measuring unit according to [[the]]an embodiment of the present invention;

Fig. 5 is a schematic construction diagram illustrating the measuring system according to [[the]]an embodiment of the present invention;

Fig. 6 is a flow chart of a process carried out by the measuring system according to [[the]]an embodiment of the present invention;

Fig. 7 is a time chart showing behavioral patterns of normal mice outputted from the measuring system according to [[the]]an embodiment of the present invention;

Fig. 8 is a time chart showing behavioral patterns of hippocampus-damaged mice outputted from the measuring system according to [[the]]an embodiment of the present invention; and

Figs. 9A and 9B are two kinds of graphs, outputted from the measuring system, showing manners in which normal mice learn changes of feeding stations according to [[the]]an embodiment of the present invention.

Please replace the paragraph beginning at page 5, line 19, with the following rewritten paragraph:

In each corner of the floor of the observation field 30, feed stations 50a, 50b, 50c, 50d for use in giving feed stored on the rotary feeder 70 to the small animals are provided as shown in Fig. 3. To be concrete, a feeding through hole 51 facing a surface of the feed on the rotary feeder 70 is made open in each corner of the floor of the observation field 30 as shown in ~~Fig. 1~~Fig. 1, and escape preventing metal nets (not shown) having two holes of a diameter (around 15 mm in case where the small

animal is a mouse) slightly smaller than that of a scull of the small animal are respectively spread over these feeding through holes 51. The small animal in the observation field 30 can eat the feed on the rotary feeder 70 by inserting their snouts, for example, through holes for feeding through the mesh of the escape preventing metal nets. Each of the four feed stations 50a, 50b, 50c, 50d is provided with an openable cover 52 for closing and opening the feeding through holes 51, and two fence-like frames 53 standing up on the floor so as to separate the feeding through holes 51 from a region of the stainless steel screen 31. In this embodiment, for example, a slide shutter reciprocatingly movable in an X-axis direction under the escape preventing ~~metal nets~~stainless steel screen 31 can be used as the openable cover 52. Although the openable cover 52 is provided so as to control the time for feeding the small animal, the openable cover is formed of a material having ventilation properties, for example, mesh or a lattice so that the smell of the feed on the rotary feeder 70 reaches the interior of the observation field 30 even when the feeding through holes 51 are closed. The fence-like frames 53 are provided so as to prevent the powdered feed and the like from scattering in the interior of the observation field 30, and the feces and urine of the animal from being mixed in the feed on the rotary feeder 70. However, it is necessary that the fence-like frames 53 be formed in such a height that the small animal can bring its head from the outside of the fence-like frames 53 to the feeding through holes 51 on the inner side of the fence-like frames 53.

Please replace the paragraph beginning at page 6, line 27, with the following rewritten paragraph:

When the small animal housed in the residence box 20 having the above construction, takes feed or drink water, ~~they stay~~such small animal stays in the observation field 30. When the small animal neither [[eat]]takes, feed nor drink water, ~~they stay~~such small animal stays in the shaded nest 40.

Please replace the paragraph on page 7, lines 3-20, with the following amended paragraph:

As shown in Fig. 1, water supply units 60 each have a hose 62 formed of silicon tube or the like with a diameter of about 2 mm, a water supply tank (not shown) joined to one end of the hose 62 via a connector, a water supply nozzle 61 fixed to the other end of the hose 62, and an electromagnetic valve 63 provided in the hose 62. The water supply tank is provided at a position higher than the three water supply through holes 21 of the residence box 20. The three water supply nozzles 61 are each inserted through the three feed water through holes 21 of the residence box 20 into the observation field 30, and fixed to the water supply through hole 21 by a metal member (not shown). Each of the water supply nozzles 61 used in this embodiment opens a nozzle port when a force is applied from the outside to a free end thereof, and closes the nozzle port when the applied force to the free end is removed. According to such a water supply unit 60, when a small animal makes a contacting action against the free end of the water supply nozzle 61, in other words, when a small animal pushes the free end of the water supply nozzle [[6l]]61 with its nose, mouth, etc., in a water supply time zone during which the electromagnetic valve 63 is opened, the water is discharged from the water tank through the nozzle port of the water supply nozzle [[6l]]61 via the hose 62.

Please replace the paragraph on page 11, lines 9-16, with the following amended paragraph:

During such measurement period, the computer 200 judges whether a predetermined period of experiment time (for example, 7 days) has passed or not (S63). When the results of judgment show that experiment time has passed, the computer 200 analyzes the data obtained as the results of the operations repeatedly carried out in S62, and outputs the results of the analysis (S64). Out of these results of analysis, concrete examples of the above analytical results concerning the feeding behaviors of the small animal are shown in Fig. 7, Fig. 8 and ~~Fig. 9~~Figs. 9A and 9B.

Please replace the paragraph on page 12, lines 1-12, with the following amended paragraph:

Fig. 8 is a time chart showing behavioral patterns of four hippocampus damaged mice ~~a, b, c, and d~~A, B, C and D in a case where the feed available station is shifted in the order of from 50a, 50b, 50c, to 50d at unit time intervals. The lapse of time from the experiment starting time is expressed by the lateral axis, and each time zone of a unit period of time on the chart is given a color having a certain density in accordance with the number (number/time) of visits of the small animals to each feed station. On this time chart as well, a color of a higher density is used to represent a larger number of visits of the small animal to the feed stations. It was ascertained from this time chart that the behavioral patterns of the hippocampus damaged mice ~~a, b, c, and d~~A, B, C and D were not fitted to the feed station

changing order of from 50a, 50b, 50c, and 50d irrespective of the lapse of time from the experiment starting time.

Please replace the paragraph on page 12, lines 17-26, with the following amended paragraph:

Fig. 9A in which the lapse of time from the experiment starting time is expressed by the lateral axis shows the transition of a correct response rate (%) 303, and that of a ratio (%) 304 of the number of visits of the mice to a feed station in which the ingestion of the feed was possible [[l]]one (1) hour before to the number of visits of the mice to a feed station in which the ingestion of the feed is impossible. It was understood from this graph that the correct response rate increased with the lapse of time from the experiment starting time, and that the number of erroneous visits of the mice to a feed station in which the ingestion of the feed was possible l hour before decreased. This proved that the normal mice learned the feed station changing order in a short period of time.

Please replace the Abstract with the following amended Abstract:

ABSTRACT OF THE DISCLOSURE

A method of measuring memory and learning capabilities of a small animal ~~including~~is provided with measuring successively a position of the small animal in an observation field with an infrared ray detector, while a computer controls opening of a plurality of covers, provided between the observation field holding the small animal therein and a feed holder storing feed therein, in a predetermined order each for a unit period. Further, the number of accessing times of the small animal to respective through holes formed on the observation field, which is opened/closed with the

covers, during each unit period, is calculated by the computer, on the basis of an output from the infrared ray detector, in which each of the through holes is provided with an escape preventing net having a hole of a diameter smaller than a diameter of a scull of the small animal.

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (Currently Amended): A method of measuring memory and learning capabilities of a small animal, comprising the steps of:

measuring successively by an infrared ray detector a position of the small animal in an observation field, while a computer controls opening and closing of a plurality of covers, provided between the observation field holding the small animal therein and a feed holder storing powdered feed therein, in a predetermined order each for a unit period, and

calculating by the computer the number of accessing times, during each unit period, of the small animal to respective through holes formed on the observation field, which is to be opened/closed with the covers, on the basis of an output from the infrared ray detector, each of said through holes being provided with an escape preventing net having a hole of a diameter smaller than a diameter of a scull of the small animal.

Claim 2 (Canceled):

Claim 3 (Currently Amended): A method of measuring memory and learning capabilities of a small animal, comprising the steps of:

measuring a position of the small animal in an observation field successively by an infrared ray detector, while a computer controls opening and closing of a

plurality of covers, provided between the observation field holding the small animal therein and a feed holder storing powdered feed therein, in a predetermined order each for a unit period and controls water supply through a plurality of nozzles, inserted into the observation field holding the small animal therein, each in a predetermined order each for a unit period, and

calculating by the computer the number of accessing times, during each unit period, of the small animal to each nozzle and respective through holes formed on the observation field, which is to be opened/closed with the covers, on the basis of an output from the infrared ray detector, each of said through holes being provided with an escape preventing net having a hole of a diameter smaller than a diameter of a scull of the small animal.

IN THE DRAWINGS

Attachment:

EXHIBIT A: Replacement Sheets (FIGs. 1 and 3)
EXHIBIT B: Annotated Sheets Showing Changes (FIGs. 1 and 3)

REMARKS

Claims 1 and 3 are pending in this application. Claim 2 has been canceled without prejudice or disclaimer. Claims 1 and 3 have been amended in accordance with current Office policy, to alternatively define Applicants' disclosed invention and to assist the Examiner to expedite compact prosecution of the instant application.

In addition, the specification has been revised where appropriate to avoid potential §112 issues. Likewise, the drawings, particularly, FIG. 1 and FIG. 3, have been revised to reflect the embodiment described in the specification.

In view of the foregoing amendments, arguments and remarks, all claims are in condition for examination. Should any questions remain unresolved, the Examiner is requested to telephone Applicants' attorney at the Washington DC area office at (703) 312-6600.

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage of fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, No. 01-2135 (Application No. 566.41216VX1), and please credit any excess fees to said deposit account.

Respectfully submitted,

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EXHIBIT A:

Replacement Sheets for FIGS. 1 and 3

FIG.1

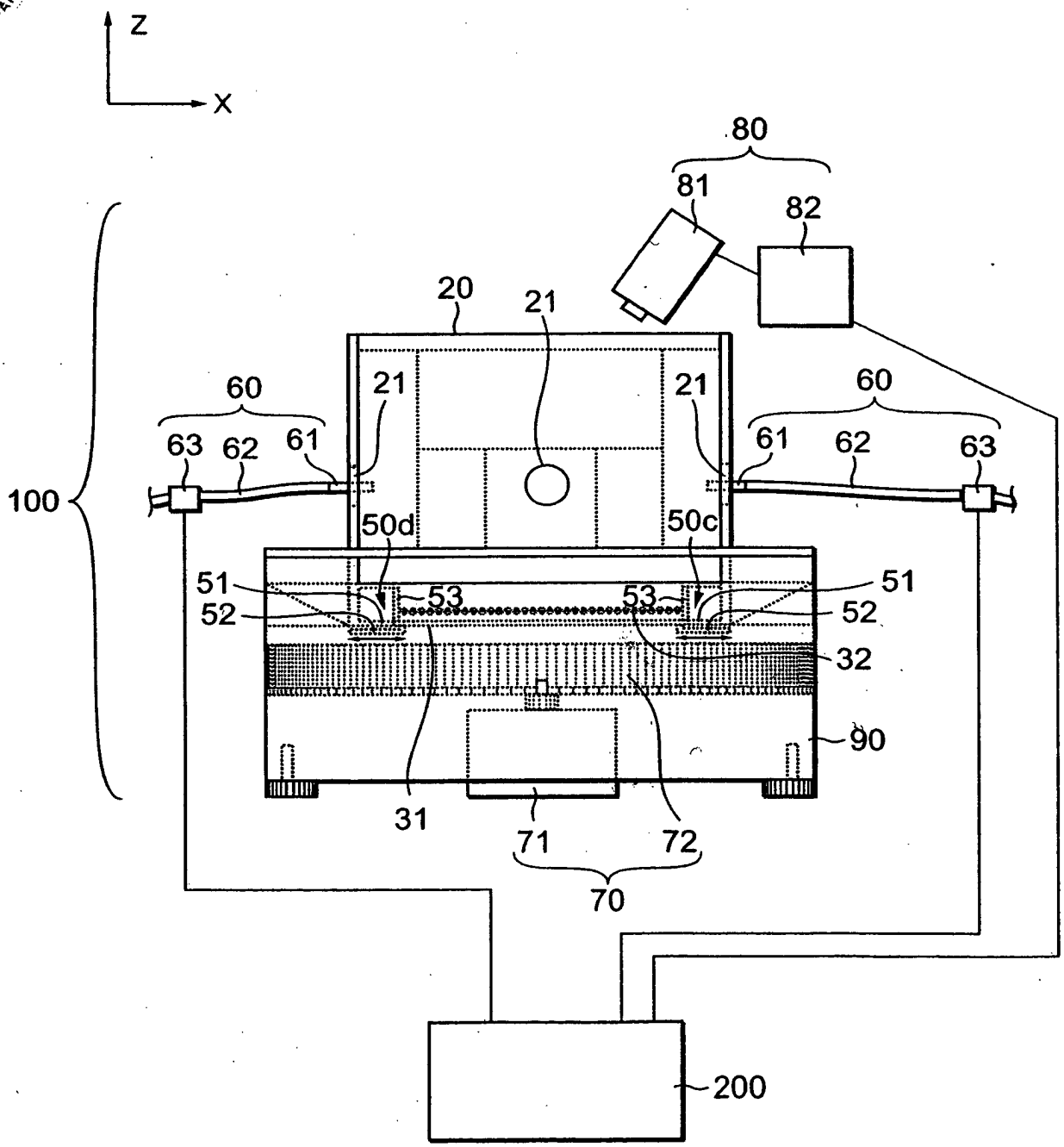

FIG.3

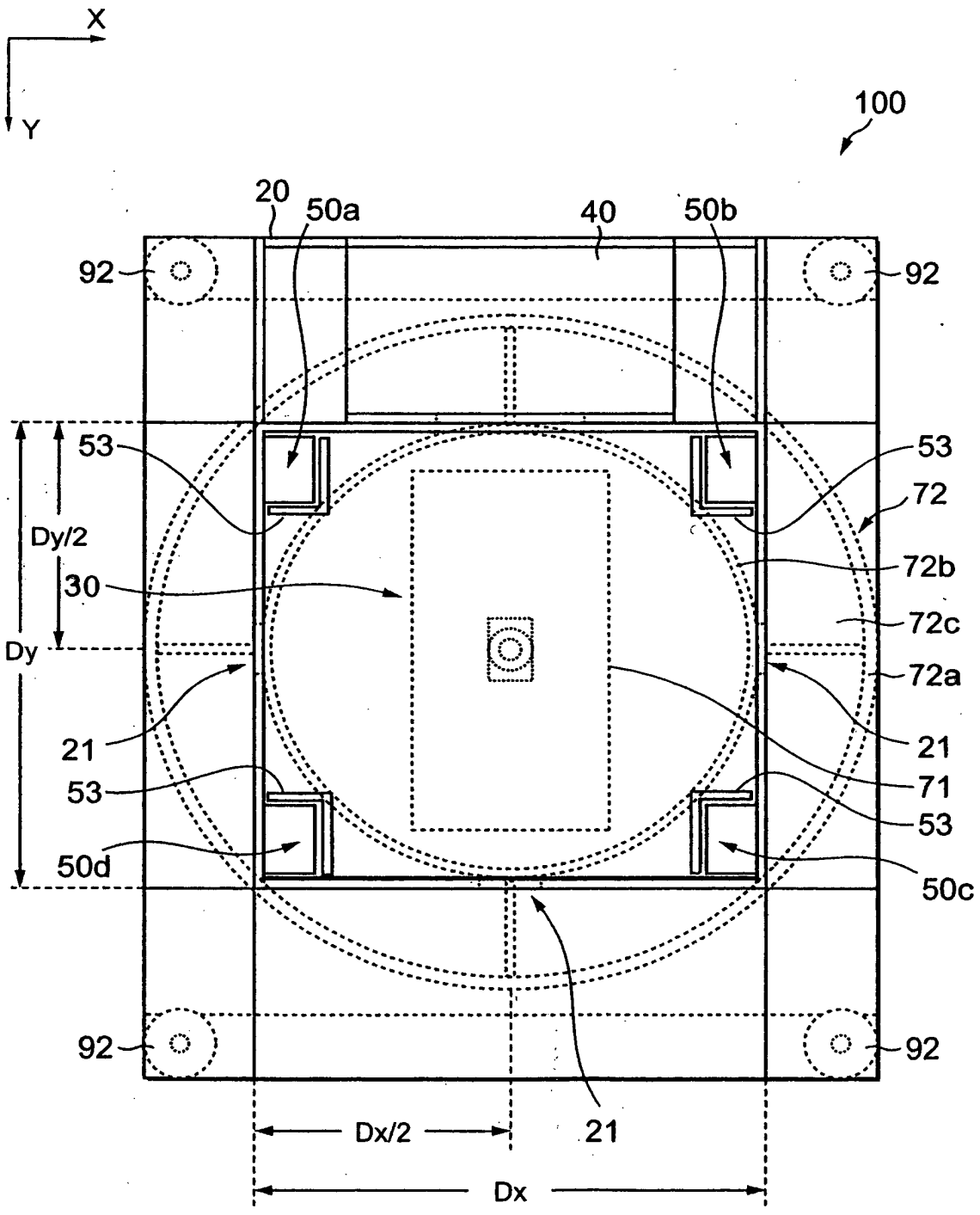

EXHIBIT B:

Annotated Sheets Showing Changes to FIGS. 1 and 3

FIG.1

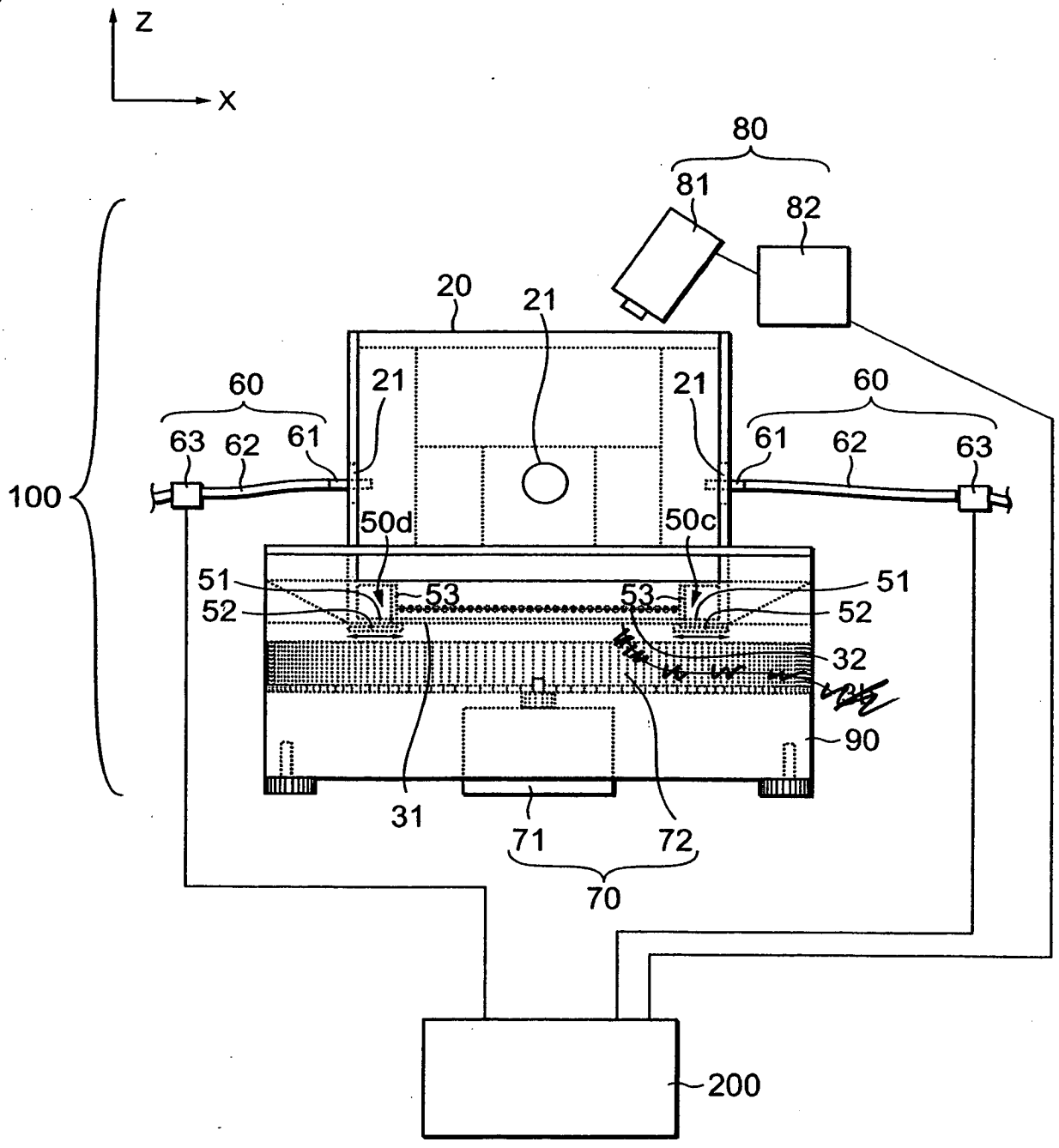

FIG.3